



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street

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High-Level Waste and Uranium Recovery Branch  
Division of Waste Management  
Office of Nuclear Material Safety and Safeguards  
Mail Stop TWFN 7J-9  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Holonich:

The U.S. Environmental Protection Agency (EPA) has reviewed the **Final Environmental Impact Statement (FEIS) to Construct and Operate the Crownpoint Uranium Solution Mining Project, McKinley County, New Mexico**. Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 C.F.R. 1500-1508, and Clean Air Act §309.

The FEIS evaluates alternatives for Hydro Resources, Inc. (HRI) to construct and operate facilities to recover uranium at three separate locations in McKinley County, New Mexico. The preferred alternative involves construction of injection and extraction wells, ion exchange plants, retention ponds, and support facilities. *In situ* leach mining and ion exchange would be conducted to recover uranium at each of the three sites. A central plant would provide drying and packaging of the "yellowcake" for transport offsite. Uranium recovery activities would be conducted at the Church Rock, Unit 1, and Crownpoint sites for eight, 17, and 19 years, respectively.

In February, 1995, EPA reviewed the Draft Environmental Impact Statement (DEIS) for this project and rated the DEIS as EO-2 -- Environmental Objections-Insufficient Information. We indicated to the Nuclear Regulatory Commission (NRC) that our objections to the proposed project were based on its proximity to domestic supply wells and residences and insufficient hydrogeologic modeling and field testing to ensure a completely closed system. We also requested additional information in the FEIS regarding the results of hydrogeologic modeling and field tests, including the potential for, and environmental impacts of, contaminated groundwater migrating off-site as a result of injection activities; aquifer restoration; and effects of drawdown of supply wells for the City of Crownpoint. We indicated that additional studies should be performed at the project sites and that this information should be provided in the FEIS. We also requested additional information in the FEIS regarding permitting, spill response,

management of sludges and other process wastes, and Radionuclide National Emissions Standards for Hazardous Air Pollutants.

Our review of the FEIS indicates that many of the issues raised in our February, 1995, DEIS comment letter have been resolved; however, several significant issues remain unresolved. Furthermore, in light of some new information, we have a few additional comments and/or questions. Our concerns regard the pressure control in the Churchrock mine workings, hydrogeologic monitoring and aquifer testing and analysis, baseline water quality, injection well design, aquifer restoration, wildlife monitoring and mitigation, waste management and emergency response, and indemnification of the federal government by HRI.

We appreciate the opportunity to review this FEIS. We wish to discuss the unresolved issues with you before NRC signs a Record of Decision (ROD). If you have any questions, please contact me at (415) 744-1584, or have your staff contact Jeanne Geselbracht at (415) 744-1576 or Jim Walker at (415) 744-1833.

Sincerely,



David J. Farrel, Chief  
Office of Federal Activities

Enclosure

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cc: Bennie Cohoe, Navajo Nation EPA  
Catherine Everett, New Mexico Environmental Department  
Ray Leissner, EPA Region 6  
Dave Sitzler, Bureau of Land Management --Albuquerque  
Leonard Robbins, Bureau of Indian Affairs -- Gallup  
Jennifer Fowler-Propst, U.S. Fish and Wildlife Service  
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## **General Comments**

EPA comments below are made primarily on the basis of our review of the FEIS and related submittals ( including the Consolidated Operations Plan (COP) Revision 2.0, August 15, 1997) and the Crownpoint Unit 1 Underground Injection Control (UIC) permit application, but without access to the complete NRC license application and full knowledge of commitments made by HRI in its application to NRC. Discussions about key issues with NRC staff, HRI representatives, and other interested parties were supplementary to our review of those documents. The license application material is voluminous, disorganized, and seemingly contradictory in some respects, making it and the FEIS difficult to evaluate. The application should be organized into one document or a cross-reference should be provided.

EPA has serious concerns about the "Performance Based License" format described in the COP. NRC has confirmed that it intends to apply the performance based license format to this project. The ability of HRI to make changes to the facility, process, or procedures presented in the COP without the prior approval of NRC or other regulatory agencies is contrary to standard EPA permitting procedures. For example, all federal UIC permit modifications require approval by EPA, and major modifications require public notice and participation in the process.

## **Indemnification**

We could not find a response to our DEIS comment that HRI should agree to indemnify the United States for the costs of any environmental damage and/or remediation. EPA considers an indemnity provision in the NRC license very important to prevent the need for the federal government to pay for any remediation of the proposed mine site.

## **Well Field Facilities**

1. Churchrock Mine Workings: Re EPA comment on DEIS: "The open shafts at the Churchrock site and any wells or holes that exhibit the potential to promote fluid migration should be plugged in a manner which will not allow the movement of fluids either into or between underground sources of drinking water (USDWs)." Response A.7.2.6 in the FEIS addresses this concern essentially by stating that vertical excursions through the open shafts can be prevented "*by sealing off the shafts or structuring well field pressures so that in the area around the shafts they are less than overlying aquifer pressures.*" The FEIS (page 4-56) states that "*HRI has not specifically demonstrated how this would be accomplished.*" HRI should be more specific in this regard. EPA is extremely concerned that wellfield pressures will not be fully controlled in the area around the shafts to the extent necessary to ensure that vertical migration cannot occur. If

possible, the open shafts and raises should be sealed to preclude fluid migration into or between USDWs. EPA may not be able to grant an aquifer exemption for the mining proposed in the Westwater Canyon aquifer in Section 17 if the openings are not effectively sealed. We have reviewed maps and a cross section of the workings recently provided by HRI. The location of the main shaft, two vent holes, and a gravel hole are shown on the maps. The locations of raises open to the horizontal workings in the Westwater Canyon, Brushy Basin, and Dakota formations are not shown on the maps provided. If these locations are not known, absolute control of vertical excursions may not be possible.

2. Monitoring the Underlying Aquifer: EPA does not necessarily agree that the Cow Springs aquifer, or other aquifers, underlying the injection zone, "*need not be monitored at any of the three sites.*" We agree that baseline water quality of the underlying aquifer should be established and pump testing conducted to test for aquifer confinement at the three sites as stated in NRC Requirement No.1 under the proposed license conditions. If confinement of the underlying aquifer from the Westwater Canyon aquifer is not conclusively established from pump testing, monitoring for excursions should be conducted similar to the monitoring proposed in the overlying aquifer(s). The federal UIC program for Navajo Indian country requires placement of monitor wells in USDWs below the injection zone of Class III injection wells if those USDWs are affected by mining operations.

3. Baseline Water Quality and Upper Control Limits: The statistical method proposed for establishing baseline means and elimination of outliers in determination of upper control limit (UCL) concentrations is not sufficiently described in the FEIS. HRI's description of the statistical assessment of baseline water quality data in Section 8.6.3 of the COP and determination of UCLs in Section 8.6.4 of the COP is incomplete. However, the COP, Revision 2.0, references the EPA document "*Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance (Chapter 8, A Discussion of Outliers)*" as a basis for determination of outliers. EPA considers the inclusion of all data within five standard deviations of the mean of the gross data to be an excessive range for determination of outliers. HRI should be required to provide a more complete description of the procedures for determination of UCLs, statistical assessment of baseline water quality data, and the treatment of outlier data prior to NRC granting a license. Descriptions and examples of the Standard Operating Procedures to be applied would be helpful. If not already a commitment in the application, baseline means should be established for the water quality in the orebody wellfield and separately for monitor wells outside the orebody.

We have concerns about the characterization of existing groundwater quality and restoration standards. For example, the uranium restoration standard proposed by NRC

of 0.44 mg/l is inconsistent with the drinking water maximum contaminant level (MCL) standard of 0.020 mg/l (or 30 pCi/L using an activity-to-mass conversion of 1.3 pCi/ug) proposed by EPA in the Federal Register of July 18, 1991 (Vol 56, NO. 138) and adopted for cleanup of an aquifer at the Fernald Superfund site. The Uranium Mill Tailings Reclamation Act (UMTRA) standard for uranium mill tailing sites is 0.044 mg/l, which is equivalent to 30 pCi/L based on the assumption of secular equilibrium. The FEIS does not explain how the proposed uranium restoration standard of 0.44 mg/l is protective of human health and the environment.

4. Aquifer Restoration: EPA is concerned about the number of pore volumes required to restore the aquifer, especially as it relates to sufficient financial assurance for closure. We are not yet convinced that nine pore volumes will be sufficient to achieve full restoration or that it can be achieved for all parameters in a reasonable time frame and cost. We also question whether the proposed restoration demonstration at Churchrock should be applied to the Unit 1 and Crownpoint sites because hydrogeological characteristics of the Unit 1 and Crownpoint sites substantially differ from the Churchrock site. In addition, based on our current knowledge of the site, a full scale demonstration may be required at each site that is permitted under the federal UIC program.

5. Monitor Wells: Additional monitor wells may be needed for better detection of excursions in the event there are preferential flow pathways not penetrated by monitor wells spaced at 400 foot intervals. The heterogeneity of an alluvial fan type deposit, such as the Westwater Canyon formation, could allow bypassing of monitor wells spaced at intervals greater than the width of an isolated channel sand deposit located between the wells. Furthermore, additional monitor wells may be required in the buffer zone outside the exempted area to detect contamination from an excursion into the surrounding USDW. In addition, the screened intervals in some of the monitor wells should coincide with the screened intervals in the orebody, and across the entire thickness of the aquifer in others. We recommend that the NRC license provide for the option to require placement of monitor wells at closer spacing and/or in tiers, and screened at various depths in the aquifer, as the wellfields are developed and additional hydrogeologic data are obtained.

6. Hydrologic Testing: The FEIS (pg. 4-43) describes premining hydrologic tests that would be conducted in each well field prior to the injection of lixiviant to evaluate vertical confinement of the well field. The FEIS indicates that the test results would be "submitted to the New Mexico Environmental Department for review," and "would be reviewed by an HRI Safety and Environmental Review Panel to ensure that the results of the hydrologic testing and the planned mining activities are consistent with technical requirements and do not conflict with any requirement stated in the NRC license." The test design and results will also be subject to the review of USEPA and NNEPA where the testing applies to mining operations in Navajo Indian country. Authorization to

commence injection of lixiviant in a new mining unit would be given only after appropriate review by USEPA and NNEPA to ensure compliance with UIC permit conditions.

7. Mechanical Integrity Issue: It should be noted that EPA Region 9 uses a **5 percent variance in 30 minutes** standard for pressure testing of injection wells, compared to the standard of 10 percent decline in 1 hour, described in the FEIS (page A-29 under Well Completions and Well Patterns), and the BLM standard of 10 percent decline in 30 minutes. EPA intends to apply its more stringent pressure test standard to injection wells permitted by the Agency.

In addition, the proposed use of PVC pipe at the Churchrock site is questioned, because *"maximum injection pressures could easily exceed the burst pressure of PVC pipe in a poorly cemented PVC-cased well,"* as stated on page 4-25 of the FEIS. The integrity of the cement sheath for the entire length of the casing is not necessarily assured by circulation of cement to surface during cementing operations, as provided by BLM specific requirements described in Section 4.3.3. The impression is left in the FEIS that PVC and fiberglass casing are acceptable for use if the **combined strength** of the casing and cement sheath exceeds the maximum operating pressure. Response 7.2.2 on page A-29 of the FEIS appears inconsistent with the discussion of casing and cement design in Section 4.3.1, page 4-25 and Section 4.3.3., page 4-63. However, BLM and/or NRC requirements appear to preclude the use of PVC or fiberglass casing where the cement sheath provides the margin of safety for burst and/or collapse strength of the casing. NRC staff have assured EPA that the requirements under the "NRC Staff-recommended Action" (FEIS, page 4-63, Section 4.3.3) would apply to the strength of uncemented casing. Federal UIC permits issued by EPA will also disallow the use of the cement sheath to satisfy casing design requirements.

The FEIS does not indicate the method to be employed to evaluate the cement sheath and the seal between the casing, cement, and borehole for integrity over the complete length of the casing; i.e., the external mechanical integrity. EPA will require in the UIC permits that the external mechanical integrity be evaluated by use of an appropriate logging device. Furthermore, EPA permits may require that casing centralizers be placed on **each joint of casing** through the Westwater Canyon formation and the overlying aquifers in order to prevent contact of the casing with the borehole through the intervals to be protected.

8. Subsurface Geology: It appears from our review of the FEIS and other license application information that the subsurface geology of the project sites may not have been sufficiently analyzed. EPA may require that HRI provide more detailed analyses of the subsurface geology at each mine site in Navajo Indian country, such as structure contour

maps, structure cross sections, and isopach maps of the Westwater Canyon, Brushy Basin, Dakota, and Recapture formations and the confining layers between each aquifer in those formations. Individual sand lenses in the Westwater Canyon should be identified and correlated in each cross-section to show lateral continuity and discontinuities where they may exist. The location of orebodies should be identified in cross-sections and in plan view. The location, orientation, and displacement of any faults should be shown.

In addition, during the technical review of UIC permit applications, EPA may require that HRI provide more detailed hydrogeologic analysis, in the form of groundwater and contaminant transport modeling at each mine site. We believe that the analysis should be performed by a third party with guidance by EPA technical staff.

### **Public Health and Emergency Response**

We understand that a memorandum of understanding (MOU) between HRI and the local health and emergency response officials must be in place before project operations can begin. The MOU should address specifically how medical emergencies and hazardous spills would be handled in the project vicinity, and what provisions HRI has committed to in order to respond to these emergencies and related concerns of the local community and health and emergency personnel.

### **Socioeconomic Impacts**

The impact analysis in the FEIS indicates positive benefits to the community based on the project's creation of jobs and royalty income or taxes to the Navajo Nation. However, it is unclear from the FEIS whether HRI has committed to hiring Navajo employees or paying taxes to the Navajo Nation. Any positive benefits to the local community are speculative until HRI commits (in writing) to hire Navajo employees and taxes to the Navajo Nation, both of which may be required by Navajo law.

### **Waste Disposal and Spill Response**

1. The reference to a zero-release NPDES permit on page 4-81 of the FEIS is confusing. In addition, the discussion regarding land application of wastewater and/or the need for an NPDES permit for wastewater discharge at the Churchrock site is vague (FEIS, p. 4-116). If an NPDES permit would be necessary in Indian country, EPA would have to comply with NEPA and consider whether to adopt this EIS before issuing a permit.
2. The FEIS, Appendix A states that metals accumulation in soils from land application of wastewater is not expected to be a problem. However, this conclusion is unfounded in the FEIS. It appears that soils irrigated with wastewater would need to be closely

monitored because soil sodium and TDS could become a significant problem. It remains unclear what standards would be used for contaminant levels and application rates. In an August 27, 1997, telephone conversation with Jeanne Geselbracht of my staff, Mark Pelizza, HRI, indicated that HRI would commit to an NRC license condition regarding monitoring and ensuring that certain threshold values in soil (e.g., sodium absorption ratios and total dissolved solids, metals, etc.) would not be exceeded as a result of land application of HRI's mine water. We recommend that a provision be included in the NRC license requiring HRI to monitor impacts to soil and the vadose zone, demonstrate that these impacts are not detrimental to soil or groundwater, and mitigate any detrimental impacts.

3. We were unable to find a response in the FEIS to our comment on the DEIS regarding how pipeline ruptures would be detected within one hour and the specific precautions and instrumentation that would be included in the plan of operations. We understand that pressure sensors would be required, but we continue to also recommend that automatic shut off valves and an automatic phone dialing system for emergency notification be incorporated into the facility designs.

### **Biological Resources**

Page 4-118: We understand that HRI does not anticipate bird mortalities or other impacts to birds and, therefore, does not intend to net ponds, although they would be relatively small. In an August 28, 1997, telephone conversation with Jeanne Geselbracht, EPA Region 9, Mark Pelizza, HRI, indicated that HRI would commit to water quality monitoring in all waste water and/or process ponds to ensure against ecological risks to birds. In addition, if bird mortalities or other adverse wildlife impacts are detected, NRC should require HRI to notify and consult with the U.S. Fish and Wildlife Service, as well as New Mexico Department of Game and Fish and the Navajo Nation to determine what measures are needed to rectify the problem. Noise and nuisance tactics may not be effective in keeping birds away from wastewater ponds at mine sites.